

The synthesis and reactions of betaines formed in reactions of tertiary phosphines with unsaturated carboxylic acids and their derivatives

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Abstract

On the basis of our systematic investigations, the main trends concerning synthesis, structure, and reactivity of carboxylate phosphobetaines - phosphorus analogs of organic aminoacids - are considered and analyzed. A wide series of phosphobetaines has been obtained in reactions of tertiary phosphines with unsaturated mono- and dicarboxylic acids, and also with their derivatives - esters and amides. By a plethora of experimental and theoretical methods, it has been shown that the thermodynamic stability of carboxylate phosphobetaines essentially depends on the structure of the initial phosphine and carboxylic acid. In some cases, the reaction between them is equilibrated. On the other hand, for a number of synthesized betaines, it is reliably established that these exist in equilibrium with isomeric phosphoranes. The extremely important condition for stabilization of phosphobetaine structures is the presence of proton-donating reagents, which are included in their crystal lattice. In the series of symmetrically substituted derivatives, the interesting phenomenon of phosphorotropy of the phosphonium group is established. The reactivity of phosphobetaines in reactions with electrophilic reagents (haloid alkyls and acyls, isocyanates, carbodiimides) has been investigated. The majority of key structures have been confirmed by the direct X-ray method. © 2006 Wiley Periodicals, Inc.

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